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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

BREWSTER, WILLIAM M

ART UNIT PAPER NUMBER

2823

DATE MAILED: 07/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/662,004

Examiner

William M. Brewster

Applicant(s)

ITONAGA ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-32 is/are pending in the application.
- 4a) Of the above claim(s) 13-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 31 and 32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 September 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

Figures 21-26 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Information Disclosure Statement

While the IDS, Paper No. 8, received 28 April 2003 has been received and considered, the IDS, Paper No. 2, filed 8 January 2001 has not been considered. If the applicants wish this IDS to be considered, then they will have to resubmit the IDS form and the accompanying prior art papers.

The information disclosure statement filed 8 January 2001 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6, 12, 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Kitajima Masahiro et al., Japanese Publication No. 11-121448, from the IDS, translation provided.

Masahiro anticipates a method of forming an insulating film, comprising the steps of: (a) in fig. 1, loading said substrate 7 including said semiconductor layer in a processing chamber; and (b) generating, within the processing chamber, plasma biased toward said substrate with the processing chamber kept in an atmosphere including oxygen, and subjecting said semiconductor layer to the biased plasma wherein an exposed portion of the semiconductor layer on the substrate is oxidized by the biased plasma in the step (b), p. 2 ¶ 10-12;

limitations from claim 2, inherently adjusting a degree of biasing the plasma, p. 2, ¶ 11, will adjust the thickness of said insulating film;

limitations from claims 3 & 4: wherein the step (b) is carried out at a temperature of 300° C, and 200° C: room temperature, p. 2, ¶ 8;

limitations from claims 6 & 31: wherein said insulating film is a gate insulating film of a MIS transistor, an oxide, p. 2, ¶ 8;

limitations from claim 12: wherein the step (b) is carried out in an atmosphere including O₂ but substantially no nitrogen, p. 3, ¶ 10.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5, 7, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masahiro as applied to claims 1-4, 6, 12, 31 above, and further in view of Haken U.S. Patent No. 4,442,591.

Masahiro does not specify forming a photoresist on the substrate, but Haken does. Haken teaches a method of forming an insulating film for a semiconductor device for forming, on a semiconductor layer exposed on a substrate, said insulating film through a reaction between at least oxygen and a semiconductor, comprising the steps of: in fig. 1, wherein the step of implanting is carried out with a photoresist film TANK PHOTORESIST formed on said substrate, a step of forming a first active region doped with an impurity of a first conductivity type P TANK IMPLANT, in fig. 3, and a second active region doped with an impurity of a second conductivity type N-TANK, in fig. 4, wherein a first insulating film and a second insulating film 700 Å, are respectively formed on said first active region and said second active region, wherein said insulating

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film is a gate insulating film of a MIS transistor, col. 8, line 31 - col. 9, line 12, further comprising, after the step (b), a step of conducting a heat treatment on said insulating film, col. 11, lines 46 - 55. Haken gives motivation in col. 1, lines 6-26. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Haken's process with Masahiro's invention would have been beneficial because it produces the transistors with low mask counts.

Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masahiro as applied to claims 1-4, 6, 12, 31 as above, and further in view of Law, European Patent No. 661,732 A2.

Masahiro does not specify a plasma process for forming the insulating film with nitrogen, but Law does. Law teaches A method of forming an insulating film for a semiconductor device for forming, on a semiconductor layer exposed on a substrate 38, said insulating film through a reaction between at least oxygen S and a semiconductor, comprising the steps of: (a) in fig. 1, loading a substrate 38 including said semiconductor layer in a processing chamber 10; and (b) generating, within the processing chamber, plasma biased toward said substrate with the processing chamber kept in an atmosphere including oxygen, and subjecting said semiconductor layer to the biased plasma, wherein the step (b) is carried out at a temperature of 300° C or less, 200° C or less: less than 250° C, wherein the step (b) is carried out in an atmosphere including nitrogen and oxygen, wherein the step (b) is carried out in an atmosphere including a NO gas, namely, a nitriding oxidation atmosphere: nitrous oxide and

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nitrogen, ABSTRACT. Law gives motivation in p. 2, lines 39-48. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Law's process with Haken's invention would have been beneficial because it reduces porosity lessening penetration of physical abrasion or the penetration of containments.

Claim 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Masahiro as applied to claims 1-4, 6, 12, 31 as above, and further in view of Samukawa, U.S. Patent No. 5,366,586.

Masahiro does not specify using a high frequency power supply for an insulating film, but Samukawa does. Samukawa teaches a method of forming an insulating film of claim 1, in fig. 6, wherein the chamber 101 includes a lower electrode 103 serving as an anode, a bias electrode (not labeled) serving as a cathode and opposing the lower electrode, and a high frequency power supply 114 for applying high frequency power to the lower electrode through a capacitor 113, the substrate is placed on the lower electrode in the step (a), and the biased plasma is generated by applying the high frequency power to the lower electrode in the step (b), col. 3, lines 47-53. Samukawa gives motivation in col. 2, lines 15-24. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Samukawa's process with Masahiro's invention would have been beneficial because it provides a method of achieving the uniform density distribution of plasma.

Response to Arguments

Applicant's arguments with respect to all claims have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that Law and Haken do not specify a biased plasma. Examiner concedes they do not, however, the nature of a §103(a) rejection necessarily means that one reference does not teach all the of the application's limitations. As the inventions do not render each other inoperable, and as motivation to combine has been cited, the references are properly combined.

As a rule, obviousness is based upon what the "references takes collectively would suggest to those of ordinary skill in the art." *In re Rosselet*, 146 USPQ 183, 186 (CCPA 1965). Furthermore, one cannot show non-obviousness by merely attacking references individually where the rejections are based on combinations of references. *In re Keller*, 208 USPQ 871 (CCPA 1981); *In re Merck & Co., Inc.*, 231 USPQ 375 (Fed. Cir. 1986). Instead, there must be an absence of "some teaching, suggestion or incentive supporting the prior art combination that produces the claimed invention." *In re Bond*, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990). "Just as piecemeal reconstruction of the prior art by selecting teachings in light of [the] disclosure is contrary to the requirements of 35 USC § 103, so is the failure to consider as a whole the references collectively as well as individually." *In re Passal*, 165 USPQ 720, 723 (CCPA 1970).

For the reasons given above, the rejection is deemed proper.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 703-305-5906. The examiner can normally be reached on Full Time.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3432 for regular communications and 703-305-3432 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

WB
July 8, 2003


Mike Chaudhry
Supervisory Patent Examiner
Technology Center 2800